

WHAT IS CLAIMED IS:

1. A method of manufacturing a magnetic particle, comprising:
the alloy particle preparation step of preparing an alloy particle capable of forming a CuAu type or Cu₃Au type hard magnetic ordered alloy phase and
5 the magnetic particle formation step;
wherein in said alloy preparation formation step, by using a mixing and reaction device which has a stirring vane rotating at a high speed in the interior of a mixer, a plurality of kinds of solutions for preparing said alloy particle are supplied to the interior of said mixer, where the plurality of kinds of solutions are mixed together and caused to react with each other by a liquid phase process, and at the same time the plurality of kinds of solutions are mixed together and caused to react with each other so that the peripheral speed in a leading end portion of said stirring vane is not less than 5 m/second.
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2. The method of manufacturing a magnetic particle according to claim 1, wherein the size of an alloy particle prepared by said mixing and reaction is 1 to 100 nm and the coefficient of variation in the particle size is not more than 15%.
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3. A method of manufacturing a magnetic particle, comprising:
the alloy particle preparation step of preparing an alloy particle capable of forming a CuAu type or Cu₃Au type hard magnetic ordered alloy phase and
the magnetic particle formation step;
20 wherein in said alloy preparation formation step, by using a mixing and reaction device in which there is provided a reaction vessel which is filled with a bulk liquid and provided therein with a mixer which has a stirring vane rotating at a high speed and is provided with an opening through which said bulk liquid is circulated to and from the interior of said reaction vessel, a plurality of kinds of solutions for preparing said alloy particle are supplied to the interior of said mixer, where the plurality of kinds of solutions are mixed together and caused to react with each other by a liquid phase process, and at the same time the plurality of kinds of solutions are mixed together and caused to react with each other so that a mixed reaction solution is discharged from said mixer to said reaction vessel by a circulating stream of said bulk liquid.
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4. The method of manufacturing a magnetic particle according to claim 3, wherein the size of an alloy particle prepared by said mixing and reaction is 1 to 100 nm and the coefficient of variation in the particle size is not more than 15%.

5. The method of manufacturing a magnetic particle according to claim 3, wherein the peripheral speed in a leading end portion of said stirring vane is not less than 5 m/second.

6. A method of manufacturing a magnetic particle, comprising:
the alloy particle preparation step of preparing an alloy particle capable of forming a CuAu type or Cu₃Au type hard magnetic ordered alloy phase and
10 the magnetic particle formation step;
wherein in said alloy preparation formation step, by using a mixing and reaction device which is provided with a mixer in the interior of a reaction vessel and has a microgap formed between an inner wall of the mixer and a stirring member rotating at a high speed and in which in order to form this microgap, when the distance from the
15 center of rotation of said stirring member to a leading end thereof is put as 1, the distance to said inner wall having the shortest distance from the center of rotation of said stirring member is set in the range of 1.001 to 1.200, a plurality of kinds of solutions for preparing said alloy particle are supplied to said microgap, where the plurality of kinds of solutions are mixed together and caused to react with each other by a liquid phase
20 process, and at the same time the plurality of kinds of solutions are mixed together and caused to react with each other so that the mixed reaction solution is discharged from said microgap.

7. The method of manufacturing a magnetic particle according to claim 6, wherein the size of an alloy particle prepared by said mixing and reaction is 1 to 100 nm and the
25 coefficient of variation in the particle size is not more than 15%.

8. The method of manufacturing a magnetic particle according to claim 3, wherein the peripheral speed in a leading end portion of said stirring member is not less than 5 m/second.

9. The method of manufacturing a magnetic particle according to claim 1, wherein said liquid phase process is the reversed micelle process and wherein as said plurality of kinds of solutions, a reversed micelle solution (solution L1), which is obtained by mixing a nonaqueous organic solvent containing a surfactant and an aqueous reductant solution, and a reversed micelle solution (solutions L2), which is obtained by mixing a nonaqueous organic solvent containing a surfactant and an aqueous metallic slat solution containing a plurality of kinds of metallic atoms constituting said alloy particle, are prepared, and said solution L1 and solutions L2 are supplied to said mixer.

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10. The method of manufacturing a magnetic particle according to claim 3, wherein said liquid phase process is the reversed micelle process and wherein as said plurality of kinds of solutions, a reversed micelle solution (solution L1), which is obtained by mixing a nonaqueous organic solvent containing a surfactant and an aqueous reductant solution, and a reversed micelle solution (solutions L2), which is obtained by mixing a nonaqueous organic solvent containing a surfactant and an aqueous metallic slat solution containing a plurality of kinds of metallic atoms constituting said alloy particle, are prepared, and said solution L1 and solutions L2 are supplied to said mixer.

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11. The method of manufacturing a magnetic particle according to claim 6, wherein said liquid phase process is the reversed micelle process and wherein as said plurality of kinds of solutions, a reversed micelle solution (solution L1), which is obtained by mixing a nonaqueous organic solvent containing a surfactant and an aqueous reductant solution, and a reversed micelle solution (solutions L2), which is obtained by mixing a nonaqueous organic solvent containing a surfactant and an aqueous metallic slat solution containing a plurality of kinds of metallic atoms constituting said alloy particle, are prepared, and said solution L1 and solutions L2 are supplied to said mixer.

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12. The method of manufacturing a magnetic particle according to claim 1, wherein said liquid phase process is the reversed micelle process and wherein as said plurality of kinds of solutions, a reversed micelle solution (Solution L1), which is obtained by mixing a nonaqueous organic solvent containing a surfactant and an aqueous reductant solution, and a reversed micelle solution (Solution L3), which is obtained by mixing a

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nonaqueous organic solvent containing a surfactant and an aqueous metallic salt solution containing one of a plurality of kinds of metallic atoms constituting said alloy particle, are prepared, the number of prepared Solutions L3 being equal to the number of said plurality of kinds of metallic atoms, and Solution L1 and the plurality of Solutions L3 are supplied to said mixer.

13. The method of manufacturing a magnetic particle according to claim 3, wherein said liquid phase process is the reversed micelle process and wherein as said plurality of kinds of solutions, a reversed micelle solution (Solution L1), which is obtained by mixing a nonaqueous organic solvent containing a surfactant and an aqueous reductant solution, and a reversed micelle solution (Solution L3), which is obtained by mixing a nonaqueous organic solvent containing a surfactant and an aqueous metallic salt solution containing one of a plurality of kinds of metallic atoms constituting said alloy particle, are prepared, the number of prepared Solutions L3 being equal to the number of said plurality of kinds of metallic atoms, and Solution L1 and the plurality of Solutions L3 are supplied to said mixer.

14. The method of manufacturing a magnetic particle according to claim 6, wherein said liquid phase process is the reversed micelle process and wherein as said plurality of kinds of solutions, a reversed micelle solution (Solution L1), which is obtained by mixing a nonaqueous organic solvent containing a surfactant and an aqueous reductant solution, and a reversed micelle solution (Solution L3), which is obtained by mixing a nonaqueous organic solvent containing a surfactant and an aqueous metallic salt solution containing one of a plurality of kinds of metallic atoms constituting said alloy particle, are prepared, the number of prepared Solutions L3 being equal to the number of said plurality of kinds of metallic atoms, and Solution L1 and the plurality of Solutions L3 are supplied to said mixer.

15. The method of manufacturing a magnetic particle according to claim 1, wherein at least two kinds of metallic atoms constituting the alloy particle capable of forming said CuAu type or Cu₃Au type hard magnetic ordered alloy phase are selected from the Groups 6, 8, 9 and 10 of the long periodic table and at least further one kind of metallic

atom is selected from the Groups 11, 12, 13, 14 and 15, the content of said one kind of metal atom being 1 to 30 atom % of the whole alloy.

16. The method of manufacturing a magnetic particle according to claim 3, wherein at least two kinds of metallic atoms constituting the alloy particle capable of forming said

5 CuAu type or Cu₃Au type hard magnetic ordered alloy phase are selected from the Groups 6, 8, 9 and 10 of the long periodic table and at least further one kind of metallic atom is selected from the Groups 11, 12, 13, 14 and 15, the content of said one kind of metal atom being 1 to 30 atom % of the whole alloy.

17. The method of manufacturing a magnetic particle according to claim 6, wherein

10 at least two kinds of metallic atoms constituting the alloy particle capable of forming said CuAu type or Cu₃Au type hard magnetic ordered alloy phase are selected from the Groups 6, 8, 9 and 10 of the long periodic table and at least further one kind of metallic atom is selected from the Groups 11, 12, 13, 14 and 15, the content of said one kind of metal atom being 1 to 30 atom % of the whole alloy.

15 18. The method of manufacturing a magnetic particle according to claim 1, wherein the mixing and reaction temperature in said alloy particle preparation step is controlled to the range of -5°C to 30°C.

19. The method of manufacturing a magnetic particle according to claim 3, wherein the mixing and reaction temperature in said alloy particle preparation step is controlled to 20 the range of -5°C to 30°C.

20. The method of manufacturing a magnetic particle according to claim 1, wherein the mixing and reaction temperature in said alloy particle preparation step is controlled to the range of -5°C to 30°C.

21. The method of manufacturing a magnetic particle according to claim 1, wherein 25 in said magnetic particle formation step of forming a CuAu type or Cu₃Au type magnetic particle from the alloy particle prepared in said alloy particle preparation step, annealing

treatment is performed after the application of an alloy-particle-containing solution, which contains the alloy particle prepared in said alloy particle preparation step to a backing.

22. The method of manufacturing a magnetic particle according to claim 3, wherein
5 in said magnetic particle formation step of forming a CuAu type or Cu₃Au type magnetic particle from the alloy particle prepared in said alloy particle preparation step, annealing treatment is performed after the application of an alloy-particle-containing solution, which contains the alloy particle prepared in said alloy particle preparation step, to a backing.

10 23. The method of manufacturing a magnetic particle according to claim 6, wherein
in said magnetic particle formation step of forming a CuAu type or Cu₃Au type magnetic particle from the alloy particle prepared in said alloy particle preparation step, annealing treatment is performed after the application of an alloy-particle-containing solution, which contains the alloy particle prepared in said alloy particle preparation step, to a
15 backing.

24. The method of manufacturing a magnetic particle according to claim 21, wherein the annealing treatment temperature in said annealing treatment is controlled in the range of 100°C to 500°C.

25. The method of manufacturing a magnetic particle according to claim 22,
20 wherein the annealing treatment temperature in said annealing treatment is controlled in the range of 100°C to 500°C.

26. The method of manufacturing a magnetic particle according to claim 23,
wherein the annealing treatment temperature in said annealing treatment is controlled in the range of 100°C to 500°C.

25 27. A magnetic particle manufactured by the method of manufacturing a magnetic particle according to claim 1.

28. A magnetic recording medium containing the magnetic particle according to claim 27 in a magnetic layer.